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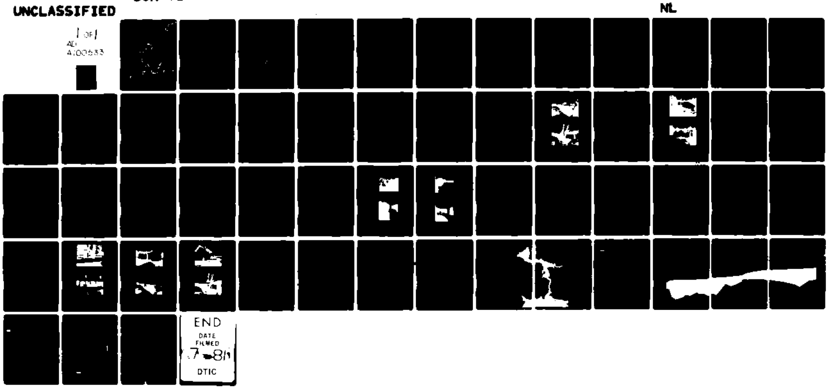
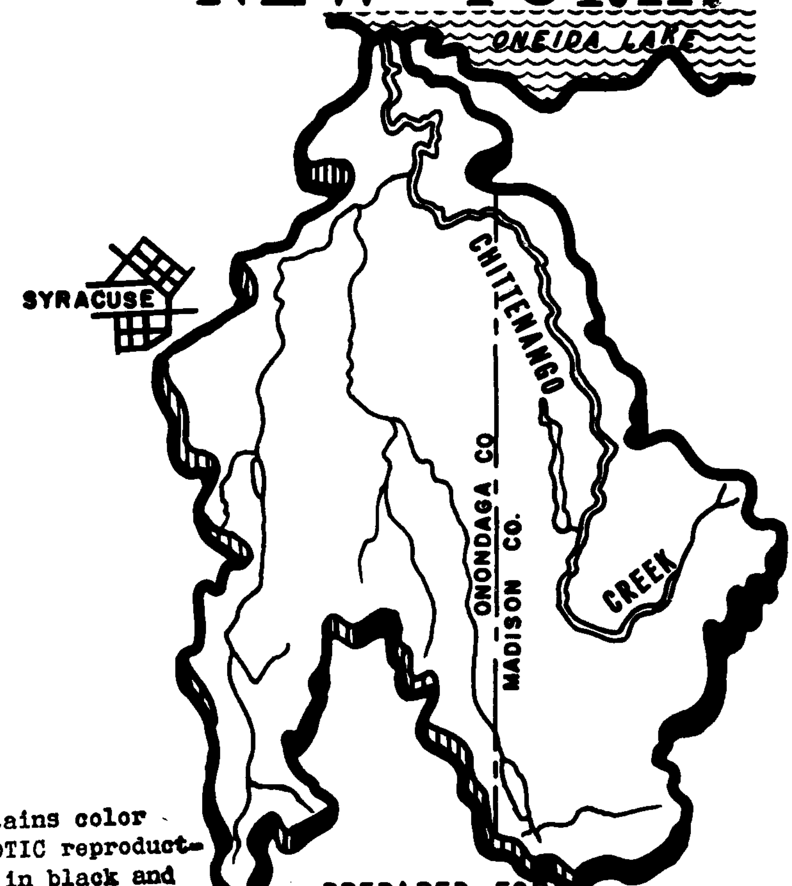


FLOOD PLAIN INFORMATION
CHITTENANGO CREEK
BRIDGEPORT
ONONDAGA AND MADISON COUNTIES
NEW YORK



PREPARED FOR
EASTERN OSWEGO BASIN REGIONAL
WATER RESOURCES PLANNING BOARD
BY
CORPS OF ENGINEERS, U. S. ARMY
BUFFALO DISTRICT
JUNE 1971

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The objective of this report is to equip planners and local officials with data which will help result in effective and workable legisaltion for the control of land use within the flood Plain. Included in this report are maps, profiles photographs, and a cross section which indicates the extent of flooding that has been experienced in the past and that which might be experienced in the future. The Chittenango Creek watershed forms a part of the Oswego River watershed. Its two main tributaries are Limestone and Butternut Creeks. This flood lain information study covers the area from the mouth at Oneida Lake to Oxbow

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Road which crosses Chittenango Creek at Creek at Creek Mile 7.04.

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INTRODUCTION

In many areas of the country, in spite of great expenditures on flood control, the flood damage potential is greater than it ever was. The primary reason for the increase of flood damage potential is unwise development of flood prone areas. An obvious solution to this problem is to exercise greater wisdom in the use of flood plains. However, such wisdom cannot be exercised unless there is an adequate knowledge of the flood hazard. The function of the Corps of Engineers, through its Flood Plain Management Services Program is to provide flood hazard information to local governments. This information may be used in developing land use regulations.

This flood plain information report on Chittenango Creek in the town of Cicero in Onondaga County and the town of Sullivan in Madison County has been prepared at the request of the Eastern Oswego Basin Regional Water Resources Planning Board through the New York State Department of Environmental Conservation, Division of Water Resources. It will be distributed to local interests through the Conservation Department.

The objective of this report is to equip planners and local officials with data which will help result in effective and workable legislation for the control of land use within the flood plain. In order to obtain this objective, this report will present technical information on the largest known floods of the past and on possible future floods, such as, the Intermediate Regional Flood and the Standard Project Flood. The Intermediate Regional Flood has a frequency of occurrence in the order of once in 100 years. This means that over a long period of time, say 500 years, the magnitude of this flood would be equalled or exceeded five times, or on the average of once every 100 years. A flood of this magnitude is defined as having a one percent chance of being equalled or exceeded in any given year. The Standard Project Flood is of

very rare occurrence and, on most streams in New York is larger than any flood that has occurred in the past. However, it is a theoretically possible flood determined from analysis of the hydrological characteristics of the stream basin and the weather extremes of the region in which it is located. It is recommended that when valuable development is planned within the flood plain, consideration be given to the levels of possible future floods, including the Standard Project Flood.

Included in this report are maps, profiles, photographs, and a cross section which indicates the extent of flooding that has been experienced in the past and that which might be experienced in the future. Consideration of these data can be very beneficial in guidance toward wise flood plain management. This report does not include plans for the solution of flood problems nor is it intended to extend Federal authority over local zoning regulations. This report is intended to be used by local planners and governments to help arrive at solutions which would minimize future flood damage and still be compatible with other local needs and goals. This planning might involve programs to limit the type of use made of the flood plain through zoning and subdivision regulations, flood proofing, flood fighting measures, the construction of flood protection works, or a combination of all approaches.

The Buffalo District of the Corps of Engineers will, upon request, provide technical assistance to Federal, State and local agencies in the interpretation and use of the information contained herein and will provide other available flood data for flood plain management and use.

SUMMARY OF FLOOD SITUATION

The Chittenango Creek watershed forms a part of the Oswego River watershed. Its two main tributaries are Limestone and Butternut Creeks.

This flood plain information study covers the area from the mouth at Oneida Lake to Oxbow Road which crosses Chittenango Creek at Creek mile 7.04. The study area is shown on plate 1.

There are no stream flow measuring stations within the study area. However, there is a water recording gage on Limestone Creek at Fayetteville, with records available from November 1939 to present; a water recording gage on Butternut Creek near Jamesville, with records available from July 1958 to present; a water recording gage on Chittenango Creek near Chittenango with records available from August 1950 to September 1968 and a water recording gage on Oneida Lake with records available from April 1904 to September 1925 and from November 1951 to present.

To supplement data obtained from the water recording stations, government officials and residents residing along the stream were interviewed and newspaper files and historical documents were searched for information. From these data and from studies of possible future floods on Limestone, Butternut and Chittenango Creeks and Oneida Lake, the local flood situation both past and future has been developed. The following paragraphs summarize the significant findings which are discussed in more detail in succeeding sections of this report.

HISTORICAL FLOODS - Historical documents indicate that the greatest flood known to have occurred in the Chittenango Creek basin was in August 1898 when two dams, in the Chittenango Creek basin, were washed away. The magnitude of this flood was very nearly approximated

in September 1915. There is insufficient information available to assign a frequency to either of these two floods.

ANOTHER GREAT FLOOD - The greatest flood in recent years occurred in March 1960. Based on known contributions of flow from Butternut, Limestone and Chittenango Creeks, the estimated frequency of occurrence of the 1960 flood is approximately once in 10 years.

OTHER LARGE FLOODS - Flooding in the Chittenango Creek basin is an annual event. From newspaper articles and Corps of Engineers files it is estimated that there has been approximately 22 floods of relative importance since 1898 in addition to the annual high water occurrences and the previously mentioned August 1898, September 1915, and March 1960 floods. Definite dates or stages are not available for a number of the earlier floods. A flood that occurred in March 1964 is estimated to have a frequency of occurrence on the order of once in 5 years.

INTERMEDIATE REGIONAL FLOOD - The Intermediate Regional Flood has an average frequency of occurrence on the order of once in 100 years and varies from 2.7 to 4.7 feet above the March 1964 flood.

STANDARD PROJECT FLOOD - The Standard Project Flood is a flood produced by the most severe combination of meteorological and hydrological conditions that is considered reasonably characteristic of the drainage basin under study. A flood of this magnitude is not assigned a frequency. The elevation of a flood of this magnitude is considered by the Corps of Engineers to be the upper limit of the flood plain.

FLOOD DAMAGES - The recurrence of major known floods would not result in a particularly large amount of damage as the flood plain in this area is used primarily for agriculture. The amount of land utilized for this purpose has been decreasing in recent years.

Since this area is not susceptible to large amounts of urban type damage, as yet, flood plain regulations enacted now would produce rewarding results in that urban type damage could be prevented, rather than remedied at a later date.

MAIN FLOOD SEASON - Flooding has occurred at all times of the year. The late winter or early spring floods are usually a result of melting snow coincident with moderate amounts of precipitation. Their flows are generally larger than those of summer floods which are caused only by intense precipitation.

VELOCITIES OF WATER - During periods of high water, as in March 1964, average channel velocities in Chittenango Creek vary from about 7 feet per second near the mouth at Oneida Lake to between 2 to 4 feet per second in the remainder of the study area. The Intermediate Regional Flood would produce velocities of about 10 feet per second near the mouth and about 3 to 6 feet per second in the remainder of the study area. During a Standard Project Flood the velocities would be considerably higher and would be dangerous to life and property. Velocities greater than 3 feet per second combined with depths of water of 3 feet or more are generally considered hazardous.

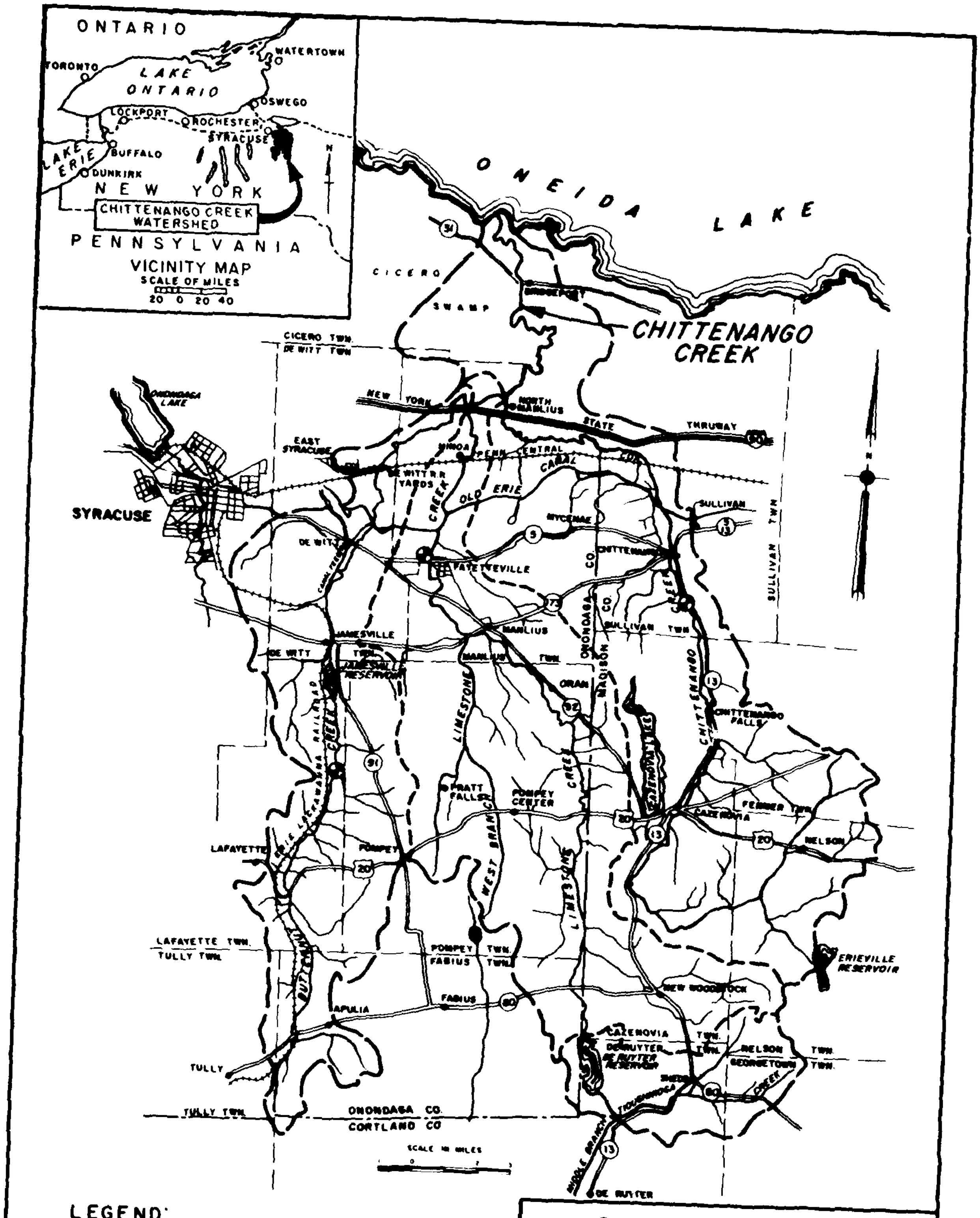
HAZARDOUS CONDITIONS - The larger floods have caused hazards to local residents in many ways. The late winter and early spring floods have large amounts of ice which may result in physical damage to buildings. In summer floods instead of ice, there are large amounts of debris carried down from upstream. Health problems may develop when sanitation facilities are inundated and untreated discharges are made into the floodway. Floods can interrupt telephone, water, gas, electric services, and travel over inundated roadways. Also, the danger of underestimating the velocity and depth of flooding can result in loss of life.

PRIOR REPORTS - A prior, favorable report of survey scope titled, "Survey Report of Chittenango Creek and Its tributaries, New York for Flood Control," was submitted to Congress 31 March 1941 and subsequently published in House Document No. 625, 77th Congress, 2nd Session, upon which Authorization of a project under the Flood Control Act of 1944 (Public Law 534, 78th Congress, 2nd Session) was made. The report recommended channel improvements consisting of cleaning, removal of obstructing bars and minor straightening on Chittenango, Limestone and Butternut Creeks, from Bridgeport to the Erie Canal. The survey report was based on a preliminary report authorized by Congress on 19 April 1939.

A definite project report for the authorized project was partially prepared in October 1946 by the then active Syracuse District office and was transferred to the Buffalo District office in November 1947. This report found that improvements were not justifiable.

In March 1967, a "Review of Reports for Flood Control Chittenango Creek, New York," was submitted to Congress. Both local protection projects and retention reservoirs were considered for providing flood protection within the Chittenango Creek watershed. None of the considered plans were recommended for construction.

FUTURE FLOOD HEIGHTS - Estimated flood crests that would be attained if either the Intermediate Regional Flood or the Standard Project Flood occurred in the study area along with the March 1964 flood are shown in table 1. This table provides a comparison of future floods with one of relative frequent occurrence.



LEGEND:

BLUE LINE INDICATES REACH COVERED BY THIS STUDY

U.S.G.S. WATER-STAGE RECORDING GAGE

CHITTENANGO CREEK
BRIDGEPORT, NEW YORK
FLOOD PLAIN INFORMATION REPORT

BASIN MAP

U.S. ARMY ENGINEER DISTRICT, BUFFALO
JUNE 1971

PLATE I

TABLE I

RELATIVE FLOOD HEIGHTS ON CHITTENANGO CREEK

Location	Mile Above Mouth	Flood	Estimated Peak Discharge (c.f.s.)	Feet Above 5-Year Flood (1)
Upstream from Oneida Lake	0.5	March 1964	5,122	
		Intermediate Regional	9,500	[illegible]
		Standard Project	35,200	[illegible]
Rte. 31 Bridge crossing (upstream side)	3.5	March 1964	5,122	
		Intermediate Regional	9,500	[illegible]
		Standard Project	35,200	[illegible]
Oxbow Road bridge crossing (downstream side)	7.04	March 1964	5,122	
		Intermediate Regional	9,500	[illegible]
		Standard Project	35,200	[illegible]

(1) The March 1964 flood is estimated to have a 5-year frequency.

GENERAL CONDITIONS AND PAST FLOODS

GENERAL

This section presents a history of floods on the downstream portion of Chittenango Creek. The study area covers the reach from the mouth of Oneida Lake and extends upstream to approximately creek mile 7.04 at Oxbow Road. This area is located in the town of Cicero in Onondaga County and the town of Sullivan in Madison County.

Chittenango Creek rises in the town of Nelson near Erieville Reservoir. It flows west for about 5 miles then generally north and passes through the towns of Cazenovia and Chittenango. At Cazenovia, outflow from Cazenovia Lake joins Chittenango Creek. From the town of Chittenango the flow is generally in a northwest direction to the town of North Manlius from which point it flows in a northerly direction through Bridgeport to Oneida Lake. Just downstream of North Manlius, Chittenango Creek is joined by Limestone Creek which contains the flow of both Butternut and Limestone Creeks.

SETTLEMENT - The earliest inhabitants of this region were the Mongoloid nomads who migrated across the Bering Strait from Asia to evolve into the Algonquin Indians. They were the first rulers of central New York who eventually gave way to the Iroquois Indian Confederacy.

The Indians had a famous fishing village called Techiroguen which is now known as Brewerton. A fort was built at Brewerton in about 1755 to command the western entrance to Lake Oneida and provide safety and protection to the frontier.

The first non-military settlement in the area was made by Oliver Stevens in 1789. He had been persuaded by two men stationed at Fort Brewerton to settle there. Stevens kept what was called a Boatman's Tavern, furnishing provisions and other

necessities to those who passed his way. He carried on a rather rigorous trade with the Indians and his prosperity encouraged others to take up settlement in the Brewerton area. Eventually, settlement spread inland and after the Revolutionary War the territory began a more substantial growth.

Most of the travel into the area was by boat. The Inland Lock and Navigation Company was charted in 1792 and boats 60 feet long drawing four feet of water passed from Schenectady to Seneca Lake or Oswego.

The manufacture of barrels for the salt industry at Salina brought prosperity to the settlers. Agriculture was generally neglected as most of the men and boys were employed in the barrel industry.

The Erie Canal opened through Syracuse in 1825 and the Oswego Canal in 1828. These canals made it easier for settlers and industries to move into the area.

As technological advancements outmoded many of the industries the settlers turned to agriculture as a means of livelihood. Today the land in the study area is generally used for agriculture or is not used at all.

The following is a list of formation dates of the political subdivisions in the study area.

a. County of Onondaga - Organized in 1794.

b. Town of Cicero - After the Revolutionary War, the land in the area was surveyed into military townships. Cicero became military township number 6. In 1794, when Onondaga County was organized, Cicero was included in the town of Lysander until February 20, 1807 when it became independent.

c. County of Madison - Organized in 1806.

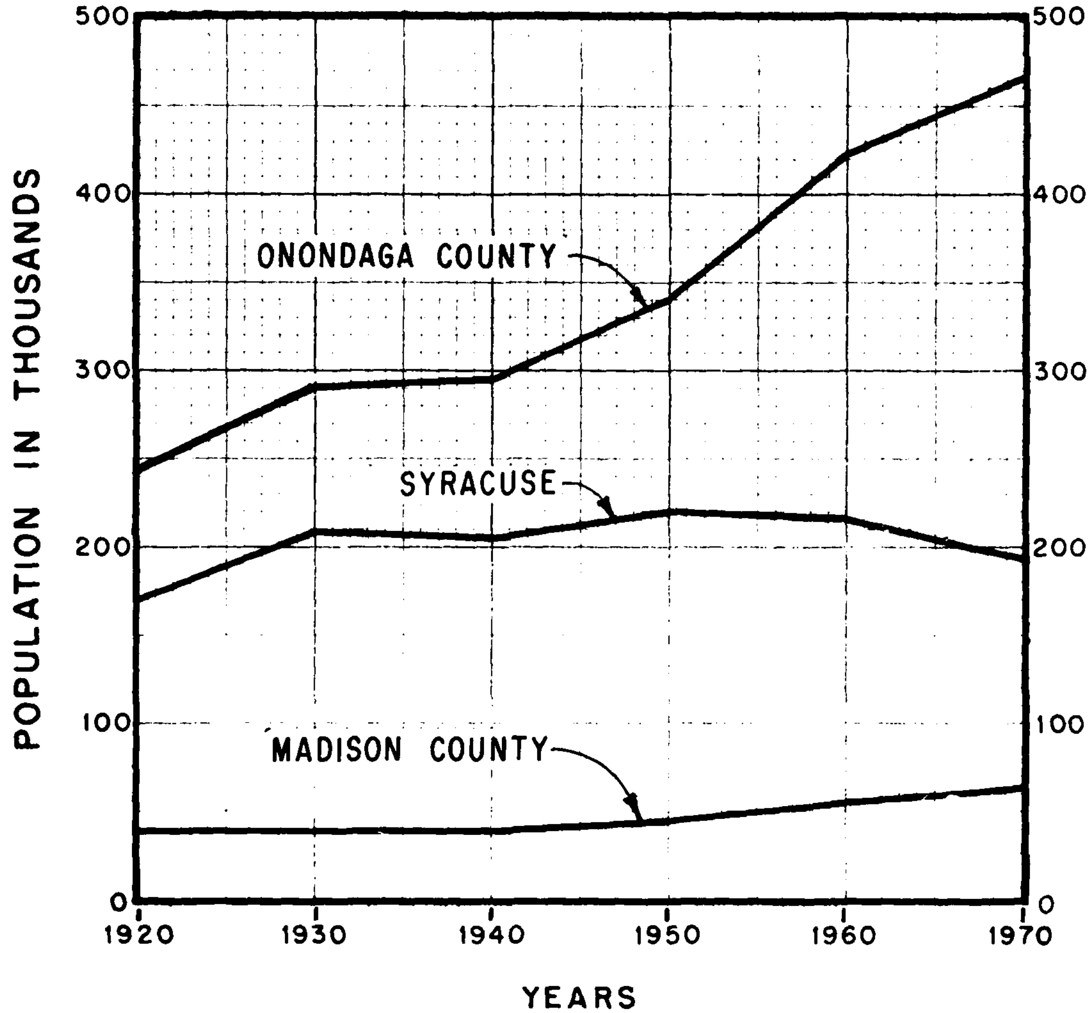
d. Town of Sullivan - Incorporated in 1842.

POPULATION - U. S. Bureau of Census figures show the population of the City of Syracuse decreased between 1960 and 1970 from 216,038 to 192,529, a drop of 11%. During the same 10-year period the following increases were noted: Onondaga County - from 423,028 to 466,334, an increase of 10%; Madison County - from 54,635 to 62,251, an increase of 14%; the town of Sullivan - from 9,369 to 11,877, an increase of 27%; the town of Cicero - from 14,725 to approximately 22,200, an increase of 51%. Figure 1 exemplifies the population trends for the counties of Onondaga and Madison and the city of Syracuse. Figure 2 exemplifies population trends for the towns of Cicero and Sullivan.

The trend suggests a rather rigorous migration to the suburbs and reflects the possible trend of development within the flood plain. It is apparent that if we are to minimize the amount of damage from flooding, proper Flood Plain Management must be instituted and enforced as soon as possible.

EXISTING REGULATIONS - Presently, there are no effective flood plain regulations in the area. However, the town of Sullivan has a proposed zoning regulation under consideration which makes mention of a "Wet Land District." Perhaps this report will help the town recognize and better define flood plain areas and result in effective flood plain management.

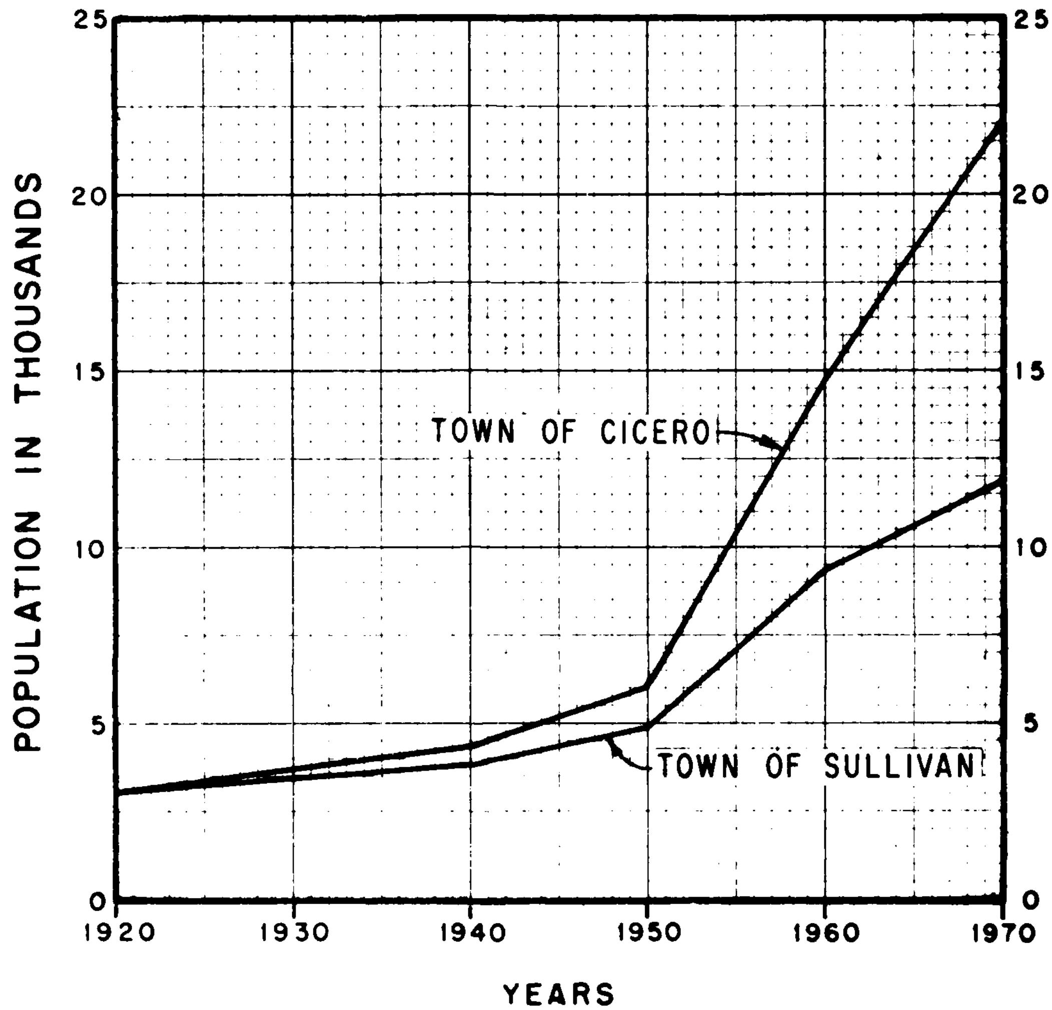
The State of New York enabling statutes which permit city zoning, specified in Chapter 21, Article 2-A, Section 24, that "such regulations shall be designed to secure safety from fire, floods and other dangers, and to promote the public health and welfare ...." The State of New York Town Law, Section 263, states "such regulations shall be made in accordance with comprehensive plan and design to lessen congestion in the streets to secure safety from fire, floods, panic and other dangers to promote health and general welfare ...." Also, Section 277 concerning planning boards and official maps states



POPULATION TRENDS

FOR ONONDAGA AND MADISON COUNTIES
AND SYRACUSE

FIGURE 1



POPULATION TRENDS

FOR TOWNS OF CICERO AND SULLIVAN

FIGURE 2

that "land shown on such plots shall be of such a character that it can be used safely for building purposes without danger to health or peril from fire, flood or other menace."

The 1965 Legislature of New York State passed amendments adding Part III A, Use and Protection of Waters, to Article 5 of the Conservation Law. Although Part III A is not meant to regulate the flood plain, it does help prevent encroachment of streams, thereby helping to reduce future flood damages. Part III A states, in part, that no person or public corporation shall change, modify or disturb the course, channel or bed of any stream or shall erect, reconstruct or repair any dam or impoundment structure without a permit from the Water Resources Commission. The amendments became effective on 1 January 1966. The full text of the Act can be found in Chapter 955, Section 429 a-g of the Laws of New York State - 1965.

FLOOD WARNING AND FORECASTING SERVICES - The Chittenango Creek area does not receive specific flood warnings or forecasting services from the National Oceanic and Atmospheric Administration, National Weather Service. The Genesee River Basin west of the Chittenango Creek basin, receives forecasting services from the Rochester Weather Bureau.

Flood forecasting for the Genesee River basin has no bearing on when floods will occur in the Chittenango Creek basin except that, in general, similar conditions could cause flooding in both areas.

The Weather Bureau at the Syracuse Airport forecasts daily climatological data and could possibly warn the surrounding area about any severe or excessive weather conditions which might develop.

THE STREAM AND ITS VALLEY - The Chittenango Creek watershed is located in central New York, in the counties of Onondaga, Madison, and Cortland and forms a part of the larger Oswego River watershed. Together with its main tributaries, Butternut and Limestone Creeks, the Chittenango Creek basin drains an area of about 288 square miles into Oneida Lake.

The gross features of the entire valley were formed largely by glaciers and post glacial lakes and streams. With the retreat of the glaciers, a series of lakes was formed at the ice front. These post glacial waters left detritus deposits which have subsequently eroded.

The relief of the Chittenango Creek basin varies from the rough topography of the Allegany Plateau at about elevation 1,500 feet in the southern part of the basin to the comparatively flat topography of the Lake Oneida plain in the northern part of the basin at about elevation 400 feet. Stream gradients vary from about 5 feet per mile in the flatlands near Oneida Lake to almost 50 feet per mile near the headwaters.

DEVELOPMENT IN THE AREA - With the exception of minor amounts of residential development near the mouth and near the community of Bridgeport, the study area is rural and relatively undeveloped. Where the flood plain is used, it is primarily for agriculture. The agricultural use of land has declined since the early 1940's and this trend is expected to continue. Therefore, it is especially important to implement flood plain regulations now while flood damageable lands are still relatively undeveloped.

BRIDGES ACROSS THE STREAM - There are two highway bridges which cross Chittenango Creek in the reach covered by this study. Table 2 lists pertinent data for these structures and the relationship of the Intermediate Regional and the Standard Project Floods to the March 1964 flood. The two bridges are shown in figures 3 and 4.

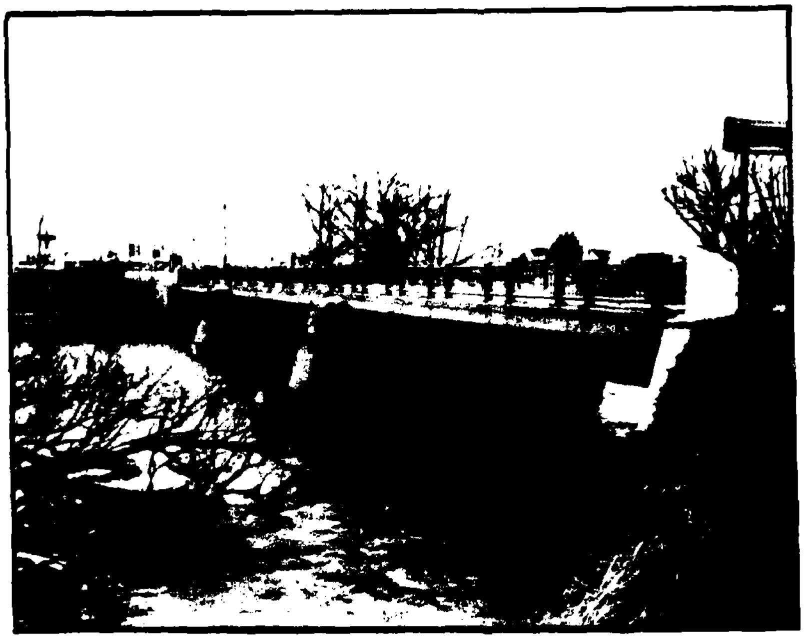


Figure 3 - Looking at upstream face of N.Y.S. Route 31 bridge.

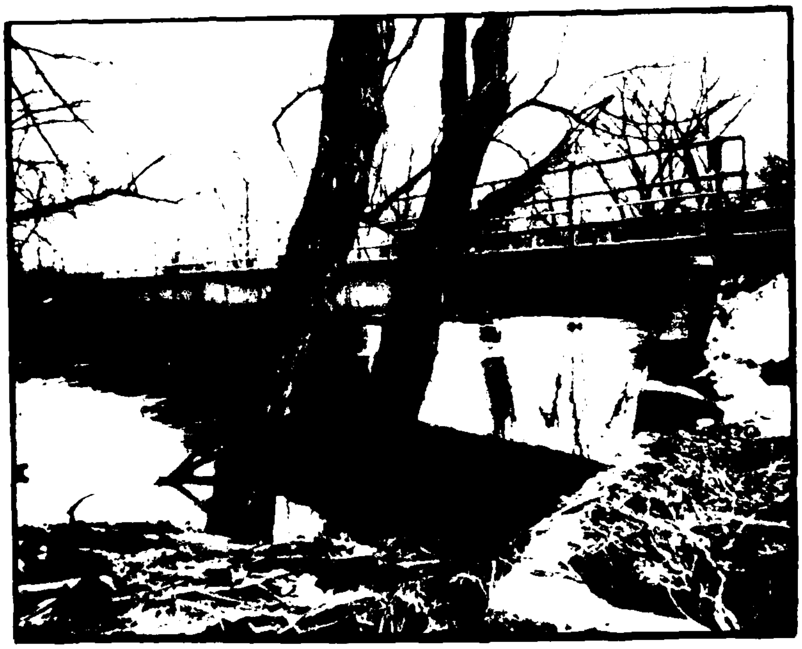


Figure 4 - Oxbow Road bridge.

Photos taken in April 1971.

OBSTRUCTIONS TO FLOOD FLOWS - When debris collects at the upstream side of bridges, flows are severely retarded. Chittenango Creek in the study area has a relatively flat gradient and has a congested meandering channel of low capacity. A natural rock weir in the channel of Chittenango Creek, near Bridgeport, causes backwater flooding of Cicero Swamp during low flood flows but has little effect on the higher flows. Figures 5 and 6 show growth in the channel which could significantly reduce the amount of flow as a result of collecting debris.

Figure 5 - Looking upstream from N.Y.S. Route 31 at growth in channel.

Figure [illegible] Looking downstream from Oxbow Road at growth in channel.

Photos taken in April 1971.

TABLE 2

BRIDGES ACROSS CHITTENANGO CREEK

Mile Above Mouth	Identification	Stream Bed Elev.	Floor Elev. (3)	Standard Project Crest Elev.	Intermediate Regional Crest Elev.	March 1964 Flood Crest Elev.	Low Steel Elev.
3.49	Route 31	372.2	387.0	389.1 (1)	382.3 (1)	378.7 (1)	382.3
7.04	Oxbow Rd.	374.5	389.8	399.8 (2)	393.9 (2)	389.2 (2)	387.2

(1) Elevations referred to upstream side of respective bridge.
(2) Elevations referred to downstream side of respective bridge.
(3) Floor elevations are referred to centerline of street at the centerline of the bridge span.

FLOOD SITUATION

FLOOD RECORDS - The U. S. Geological Survey has maintained records of stages and discharges on the three main creeks of the Chittenango Creek basin and stages for Oneida Lake.

The water recording gages are on Limestone Creek at Fayetteville, Butternut Creek near Jamesville, Chittenango Creek near Chittenango, and Oneida Lake at Brewerton.

To supplement the records obtained at these gaging stations, local residents and local officials were interviewed for information on past floods. Newspaper files were searched along with historical documents and records. Valuable information was obtained from interviews made after floods. A history of floods dating back to 1898 has been developed from these records and investigations.

DURATION AND RATE OF RISE - Shown on plate 2 is the stage hydrograph for the March 1964 flood at the upstream side of State Route 31 in Bridgeport. During the March 1964 flood, the creek rose to its crest in 54 hours at an average rate of 0.1 foot per hour with a maximum rate of 0.2 foot per hour. The water remained above bankfull (flood) stage for 40 hours.

VELOCITIES - During the March 1964 flood, channel velocities on Chittenango Creek varied from about 7 feet per second near the mouth at Oneida Lake to between 2 and 4 feet per second in the remainder of the study area. The overbank velocities in this flat area are generally 1 foot per second or less. During larger floods such as the Intermediate Regional and the Standard Project Floods, higher stream flow velocities could be expected which would be dangerous to life and property. Velocities greater than 3 feet per second combined with depths of 3 feet or greater are generally considered hazardous.

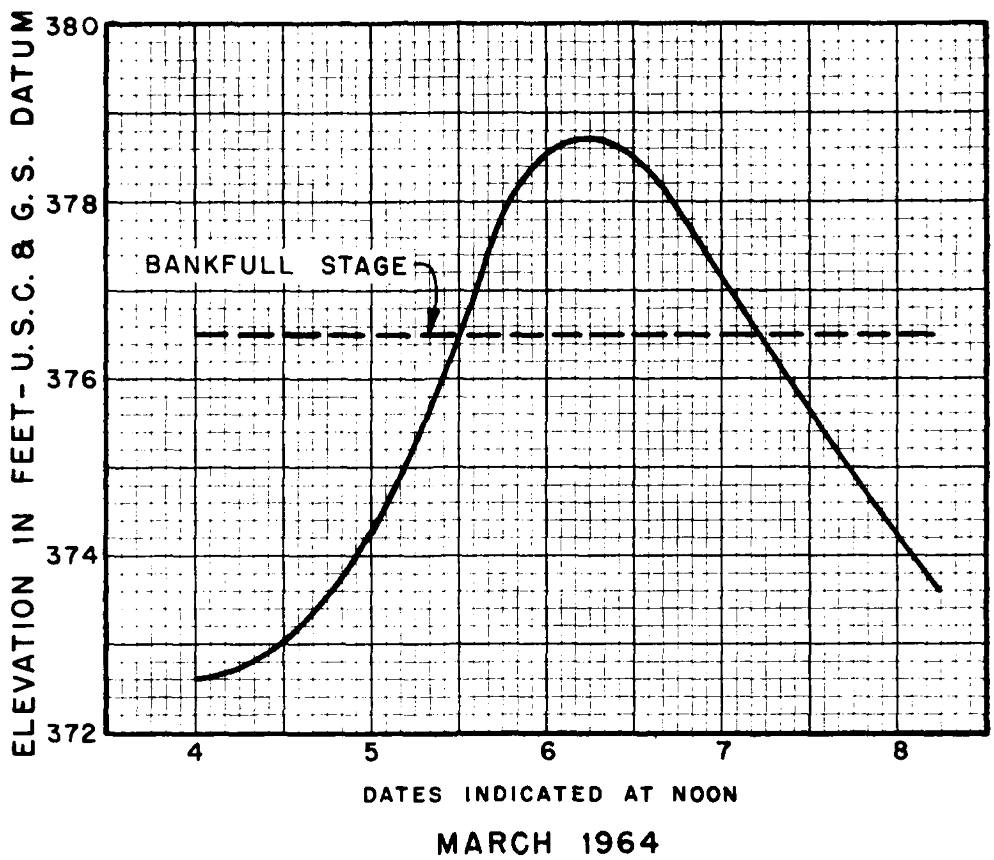
FLOODED AREAS, FLOOD PROFILES AND CROSS SECTIONS - Plate 3 shows the approximate area along Chittenango Creek that would be inundated by the March 1964, Intermediate Regional and Standard Project Floods. The actual limits of these overflow areas on the ground may vary from those shown on the map because the 5-foot contour interval and scale of the map do not permit precise plotting of the flooded area boundaries. These plates are designed to show the approximate areas subject to flooding so that individuals and governments realize the areas where the flood hazard must be considered before developing.

Plate 4 shows the high water profile for the March 1964 flood and the Intermediate Regional, and Standard Project Floods which are discussed in the "Future Floods" section of this report.

These flood profiles provide the information needed to be able to build above flood elevations and to develop an effective regulation plan.

Plate 5 shows a valley cross section which is representative of the flood plain within the area investigated. The approximate elevations of the March 1964, Intermediate Regional, and Standard Project Floods are indicated on the section.

By using the flooded area maps, flood profiles, and the valley cross section contained in this report as a guide, local governments can pass regulations to limit flood plain development. Use of the flood plain for recreational type development should be encouraged. In the future, recreational facilities of all types will be needed in the study area as the population increases. The placement of parks, athletic fields, golf courses, drive-in theaters and similar development in areas which are susceptible to frequent flooding is recommended because of their important value and relatively small flood damage potential. If future high value flood damageable development is considered in areas subject to frequent flooding, it should be raised above the



NOTES:

STAGE HYDROGRAPH WAS DERIVED USING THE DISCHARGE MEASUREMENTS TAKEN DURING THE MARCH 1964 FLOOD.

BANKFULL STAGE IS ALSO THE INITIAL DAMAGING STAGE.

DRAINAGE AREA = 282 SQ. MILES. DOES NOT INCLUDE 1.37 SQ. MI. IN CLOSED BASIN, 16.46 SQ. MI. DIVERTED TO ERIE BARGE CANAL, AND 13.98 SQ. MI. CONTRIBUTED BY MIDDLE BRANCH TIOUGHNIOGA RIVER DIVERSION.

CHITTENANGO CREEK
BRIDGEPORT, NEW YORK
FLOOD PLAIN INFORMATION REPORT

STAGE HYDROGRAPH

U.S. ARMY ENGINEER DISTRICT, BUFFALO
JUNE 1971

Intermediate Regional Flood level. If it is found uneconomical to elevate the land in these areas, means of flood proofing the structure should be incorporated.

FLOOD DESCRIPTIONS

Descriptions of known large floods that have occurred in the study area are based upon field investigations, historical records and newspaper accounts. The greatest flood of historical record occurred in August 1898. A condensation of available information on past flood occurrences is given in the following paragraphs. This information is presented to illustrate the type and extent of flood problems which have occurred and give an indication of possible future flood problems.

Past flooding has occurred both in the summer, from excessive rainfall, and in winter from a combination of snowmelt and rainfall.

AUGUST 1898 - Historical documents and interviews with older residents show that the largest known flood occurred during August 1898. Its magnitude was so great that two dams in the Chittenango Creek basin were washed away.

SEPTEMBER 1915 - This flood approached the severity of the 1898 flood. Violent thunderstorms attended by unusually heavy rainfall on the 13th caused excessive runoff. This flood resulted in many demolished bridges throughout the basin.

APRIL 1940 - The melting of a heavy snow cover, together with moderate to heavy rains during the last part of March, caused flooding within the study area. The flooding in the "flats" area, according to residents, approached the floods of 1915 and 1898 in magnitude. Much of the "flats" area was inundated and all crossroads were closed. Figure 7 shows the stage at Route 31 in Bridgeport.

MARCH 1950 - On the 2nd and 3rd of the month, a cold air mass, advancing behind an easterly moving low pressure system, brought high winds and blizzard like conditions to Onondaga County. Many secondary roads were closed by drifts 10 to 15 feet in depth.

Following a period of cold weather, a low pressure system crossing the Great Lakes and southeasterly Canada on the 8th and 9th produced one of the heaviest precipitation periods in the State for the month of March. On the 27th, another low pressure system, advancing from the interior of the country to the Great Lakes region brought heavy rains to most of the State. Temperatures rose so that from rain and melting snow, flood conditions developed. Lowlands and highways were inundated within the study area.

MARCH 1960 - Flooding resulted from melting snow combined with heavy rain on 30 and 31 March falling on previously saturated ground. Flood waters caused substantial damage to docks and basements of approximately 46 summer residences between Oneida Lake and Bridgeport.

MARCH 1964 - A low pressure system in the Mississippi Valley produced a cold front that began moving toward Syracuse. At the same time, warm moist air began moving up from the Gulf of Mexico. These two systems clashed over the plains of southern Illinois. The low pressure deepened and with it came wind and rain. In the Syracuse area the temperature rose into the 60's and was accompanied by 60-mile per hour winds. This combination caused considerable flooding within the study area. Figures 7-10 show flooding conditions that occurred in March 1964.

This concludes the "General Conditions and Past Floods" section of this report. However, what can and should be done to prevent and/or reduce future flood damages? Under the New York State "home rule" type of government, it is the prerogative and responsibility of local governments to develop and enforce, as soon as possible, flood plain regulations based on the information contained in this report. This report provides the necessary tools to control the extent and assure the proper type of development which should be allowed within the

flood plain. Regulation of the flood plain can usually be carried out most effectively by a combination of several regulatory methods, such as zoning ordinances, subdivision regulations and building codes. The regulations should establish a floodway to insure against encroachment by fills and developments. An annual maintenance program should be established to remove the accumulation of brush, weeds, debris and large trees which may obstruct flood flows. In order to assist local governments, the U. S. Army Corps of Engineers has prepared and is distributing to State, County and local governments copies of pamphlets entitled "Guidelines for Reducing Flood Damages," and for those presently in the flood plain or planning to build in areas subject to possible flooding, "Introduction to Flood Proofing." The use of data presented in this report along with the above mentioned pamphlets will provide general guidelines for flood damage reduction to existing and possible future development within the flood plain of Chittenango Creek. The U. S. Army Corps of Engineers will distribute to State, County, and local governments other helpful pamphlets as well as additions to existing pamphlets as they are developed. Figure 11 lists corrective and preventive measures used in flood damage prevention.

Figure 7 - Looking at upstream face of N.Y.S. Route 31 bridge in Bridgeport. April 1940 flood.

Figure 8 - Looking south along N.Y.S. Route 298 within the Cicero Game Management Area. March 1964 flood.

Figure 9 - Looking north at upstream face of N.Y.S. Route 31 bridge in Bridgeport. March 1964 flood.

Figure 10 - View of farm located approximately at stream mile 7.5. March 1964 flood.

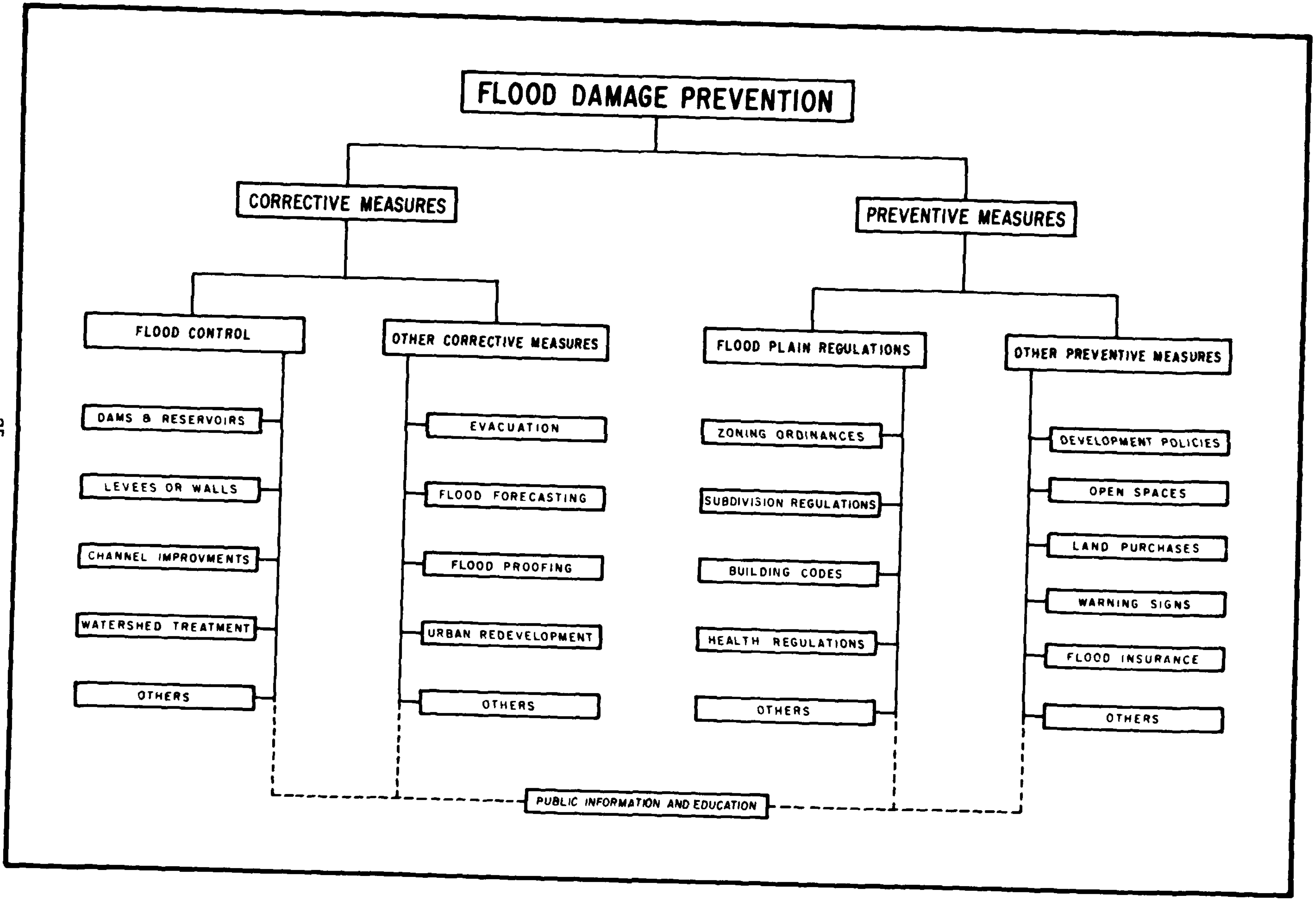

FLOOD DAMAGE PREVENTION
CORRECTIVE MEASURES
PREVENTIVE MEASURES
FLOOD CONTROL
OTHER CORRECTIVE MEASURES
FLOOD PLAIN REGULATIONS
OTHER PREVENTIVE MEASURES
DAMS & RESERVOIRS
LEVEES OR WALLS
CHANNEL IMPROVMENTS
WATERSHED TREATMENT
OTHERS
EVACUATION
FLOOD FORECASTING
FLOOD PROOFING
URBAN REDEVELOPMENT
OTHERS
ZONING ORDINANCES
SUBDIVISION REGULATIONS
BUILDING CODES
HEALTH REGULATIONS
OTHERS
DEVELOPMENT POLICIES
OPEN SPACES
LAND PURCHASES
WARNING SIGNS
FLOOD INSURANCE
OTHERS
PUBLIC INFORMATION AND EDUCATION

FIGURE 11

FUTURE FLOODS

This section of the report discusses the Standard Project and the Intermediate Regional Floods which are possible future floods that could occur on Chittenango Creek. The Standard Project Flood represents the upper limit of expected flooding. The Intermediate Regional Flood represents a flood that may reasonably be expected to occur on the average of once every 100 years.

Large floods have been experienced in the past on Chittenango Creek and on other streams in the general geographical and physiographical region of this study. Heavy storms similar to those causing these floods could occur again over the watershed of Chittenango Creek. In this event, flooding would result on Chittenango Creek and neighboring streams. Therefore, in connection with any determination of future floods which may occur on Chittenango Creek, consideration was given to storms and floods that have occurred in the region on watersheds whose topography, watershed cover, and physical characteristics are similar to Chittenango Creek.

Table 3 lists the maximum known floods, their date, peak discharge, discharge per square mile and recurrence interval that have occurred at various U.S.G.S. gaging stations in the region of this study area. Inspection of table 5 shows that floods of the magnitude of the Intermediate Regional Flood and larger have occurred in the vicinity of Chittenango Creek and could occur again.

TABLE 3

MAXIMUM KNOWN FLOOD DISCHARGES AT U.S.G.S. GAGING STATIONS IN THE REGION OF CHITTENANGO CREEK, NEW YORK

Stream	Gage Location	Period of Record (years)	Drainage Area (sq. mi.)	Peak discharge of record (cfs) Date	Amount	Sq. Mi.	Estimate Recurrence Interval (years)(3)
Limestone Creek	Fayetteville	30	85.5	28 March 1950	7,010	84.5	25
Butternut Creek	Jamesville	11	32.2	5 March 1964	1,260	39.1	4 (4)
Chittenango Creek	Chittenango	19	66.3	11 Feb 1960	2,690	40.6	4 (4)
Canandaigua Outlet	Lyons	44	441	31 March 1960	13,000 (2) (1)	20.5	200
Flint Creek	Phelps	10	102	30 March 1960	2,940	28.8	9
Cayuga Inlet	Ithaca	31	145.5	8 July 1935	22,000 (1)	151.2	200
Fall Creek	Ithaca	44	126	8 July 1935	15,500	123	greater than 200
Seneca River	Baldwinsville	19	3136	4 April 1960	17,200 (2)	5.5	33

(1) Corps of Engineers estimate.
(2) Regulated flow.
(3) Based on conditions of development at time of flood.
(4) More than one flood of this approximate magnitude.

DETERMINATION OF INTERMEDIATE REGIONAL FLOOD

The Intermediate Regional Flood is defined as a flood having an average frequency of occurrence in the order of once in 100 years, at a designated location, although the flood may occur in any year. Some probability estimates are based on statistical analysis of streamflow records available for the watershed under study but limitations in such records usually require analysis of rainfall and runoff characteristics in the "general region" of the area under study. Results of the hydrologic study show that the Intermediate Regional Flood on Chittenango Creek in the study area would have a peak discharge of 9,500 cfs.

An occurrence of the Intermediate Regional Flood on Chittenango Creek would result in stages that would vary from 3.3 to 4.7 feet higher than the March 1964 flood in the study area. The March 1964 flood produced considerable damage in the study area. The Intermediate Regional Flood represents a major flood, although it is much less severe than the Standard Project Flood.

DETERMINATION OF STANDARD PROJECT FLOOD

Only in rare instances has a specific stream experienced the largest flood that is likely to occur. Severe as the maximum known flood may have been on a given stream, it is a commonly accepted fact that in practically all cases, sooner or later a larger flood can and probably will occur. The Corps of Engineers, in cooperation with the Weather Bureau, has made broad and comprehensive studies and investigations based on the vast records of experienced storms and floods and has evolved a generalized procedure for estimating the flood potential of streams. These procedures have been used in determining the Standard Project Flood. It is defined as the largest flood that can be expected from the most severe combination of meteorological and hydrological conditions that is considered reasonably characteristic of the geographical region involved excluding extremely rare combinations.

The Standard Project Flood magnitude was determined for Chittenango Creek at the mouth. The theoretical storm which will produce a flood of Standard Project magnitude contained rainfall amounts of 5.00 inches in three hours, 7.50 inches in six hours, 9.20 inches in 24 hours and 11.60 inches in 96 hours. The peak discharge of the Standard Project Flood on Chittenango Creek at the mouth is 35,200 c.f.s. Although the rainfall of a Standard Project Storm is severe, its magnitude has been approached in several areas in New York and Northern Pennsylvania. In July 1942, rainfall of 8.48 inches in a 24-hour period was recorded at Coudersport, Pennsylvania and unofficial precipitation stations reported rainfall in excess of 20 inches over a 200-square mile area in northern Pennsylvania and southern New York. In July 1935, 10.5 inches of precipitation was recorded at Burdett, New York in a 48-hour period.

Unfortunately, when data are given pertaining to future floods such as the Intermediate Regional and Standard Project Floods, people have the opinion that this will probably not happen during their lifetime and have a tendency to ignore the potential problems. Although it is true that the Intermediate Regional Flood has a recurrence interval in the order of once in 100 years and the Standard Project Flood is even less frequent, it must be kept in mind that either or both floods can happen in any given year.

FREQUENCY - It is not practical to assign a frequency to the Standard Project Flood. The occurrence of such a flood would be a very rare event; however, it could occur in any year and it is not the most severe flood that could occur. The Standard Project Flood is presented in this report to show the reasonable upper limit of the flood plain.

POSSIBLE LARGER FLOODS - Floods larger than the Standard Project Flood are possible; however, the combination of factors that would be necessary to produce such flood would seldom if ever, occur. The consideration of floods of this magnitude should be considered dependent on the type of development and the risk of utilizing the flood plain.

HAZARDS OF GREAT FLOODS

The amount and extent of damage caused by any flood depends in general upon how much area is flooded, the height of flooding, the velocity of flow, the rate of rise and the duration of flooding.

AREAS FLOODED AND HEIGHTS OF FLOODING - The areas along Chittenango Creek flooded by the Standard Project Flood and the Intermediate Regional Flood are shown on plate 3. Depths of flooding can be estimated from the cross section which is shown on plate 5.

The March 1964 flood profile was developed using a combination of hydraulic computations and actual high water marks. The Intermediate Regional and Standard Project Floods were computed by using stream characteristics for selected reaches as determined from observed flood profiles, topographic maps and valley cross sections. The overflow areas shown on plate 3 and the water surface profiles shown on plate 4 have been determined with an accuracy consistent with the purpose of this study and the accuracy of the available data. The Standard Project Flood overflow in the urban areas should be considered to be only indicative because of the effects of buildings and other large obstructions. The water surface profiles of the Standard Project and Intermediate Regional Floods depend to a great extent upon the degree of destruction or clogging of various bridges during the flood occurrence. Because it is impossible to forecast these events, it was assumed that all bridge structures would stand and that no clogging would occur.

The Standard Project Flood profile for Chittenango Creek is approximately 11 feet higher at Oxbow Road and 7 feet higher at the mouth at Oneida Lake than the March 1964 flood.

The Intermediate Regional Flood profile would be from 3.3 feet higher at the mouth to approximately 4.7 feet higher at Oxbow Road than the March 1964 flood.

Figure 12 - Arrows indicate the heights of the Standard Project, Intermediate Regional, and March 1960 floods, stream mile 0.5.

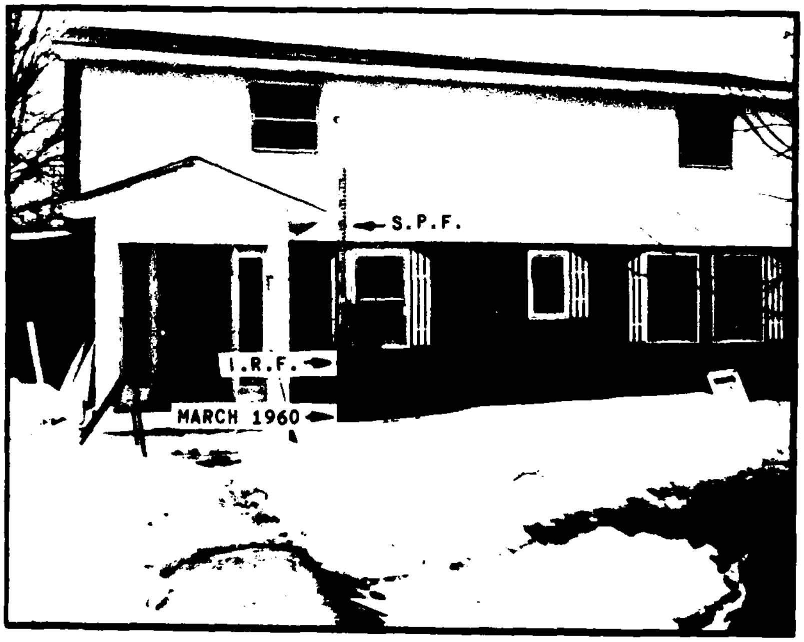


Figure 13 - Arrows indicate the heights of the Standard Project, Intermediate Regional, and March 1960 floods at residence on Hitchcock Road, stream mile 1.8.

Possible future flood heights
Photos taken in April 1971.

Figure 14 - Arrows indicate the heights of the Standard Project and Intermediate Regional floods at pumphouse just downstream of N.Y.S. Route 31, stream mile 3.4.

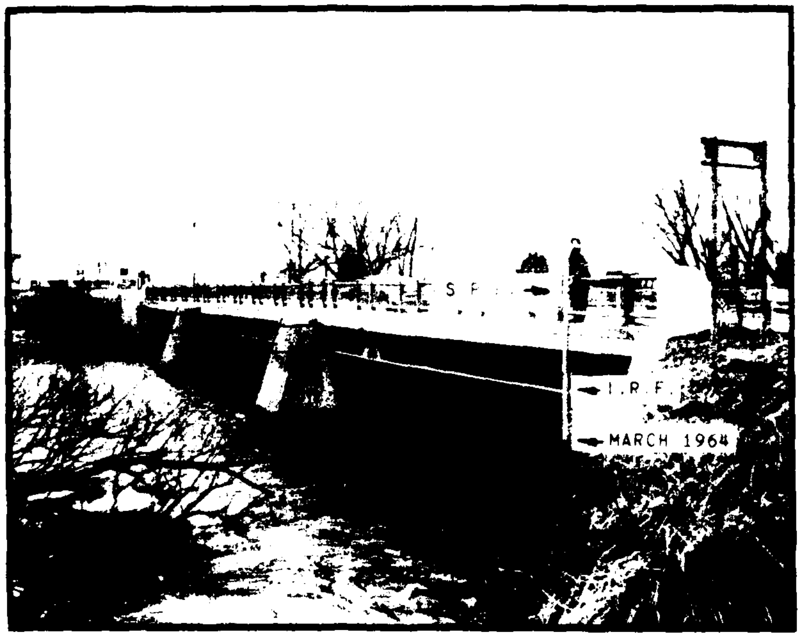


Figure 15 - Arrows indicate the heights of the Standard Project, Intermediate Regional, and March 1964 floods at the upstream side of N.Y.S. Route 31 bridge, stream mile 3.5.

Possible future flood heights
Photos taken in April 1971.

Figure 16 - Arrows indicate the heights of the Standard Project, Intermediate Regional, and March 1960 floods at residence on N.Y.S. Route 298, stream mile 4.7.

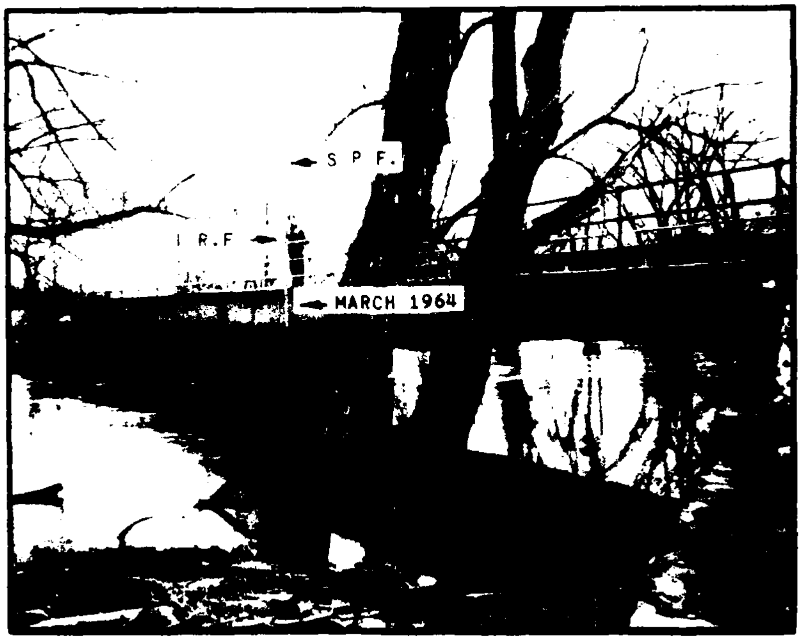


Figure 17 - Arrows indicate the heights of the Standard Project, Intermediate Regional, and March 1964 floods at the upstream side of Oxbow Road bridge, stream mile 7.04.

Possible future flood heights
Photos taken in April 1971.

Elevations of the Intermediate Regional and Standard Project Floods should be given careful consideration in all future planning, because of the large difference between past flood elevations and possible future flood heights.

Figures 12 through 17 are photographs which show the heights that would be reached by the Standard Project and the Intermediate Regional Flood on structures presently existing within the flood plain in the study area.

VELOCITIES, RATES OF RISE AND DURATION OF FLOODING - Average channel velocities during floods depend largely upon the size and shape of the channel section, the composition of the surface with which the water is in contact, the condition of the stream and the slope of the channel bottom, all of which vary on different streams and at different locations on the same stream.

Frequently rates of rise may not give adequate warning that a flood is coming. Debris clogging and ice jamming can act as a dam and cause water to form a pond. When sufficient head accumulates in the pond to break the dam a surge of water would flow downstream causing an almost instantaneous rate of rise.

High channel and overbank velocities in combination with deep, fairly long duration flooding would create a hazardous situation in the flood plain.

Table 4 lists the average velocities that would occur in the channel and overbank areas for a discharge of Intermediate Regional and Standard Project Flood magnitude.

TABLE 4

INTERMEDIATE REGIONAL AND STANDARD PROJECT

FLOOD VELOCITIES

	Average Velocities			
	Intermediate Regional		Standard Project	
Creek Mile	Channel ft. per sec.	Overbank ft. per sec.	Channel ft. per sec.	Overbank ft. per sec.
1.00	4.4	0.1	8.2	0.3
2.82	4.4	0.1	7.5	0.3
5.90	4.4	0.1	8.0	0.3
7.05	3.8	0.1	6.4	0.3

NOTE: Since table 4 indicates only average velocities, maximum velocities would be somewhat greater in both channel and overbank areas.

Rates of rise are dependent upon the slope of the basin, intensity of the storm, development within the basin and infiltration of rainfall. It can also depend upon the condition and amount of debris in the channel at the time of the storm. The duration of a flood above bankfull stage is dependent upon the duration of the storm. In this report it was assumed that the flood was caused by rainfall without prolonged runoff from snowmelt or high stages caused by ice jams. Table 5 lists the total rise from low water to the crest, the maximum rate of rise and the duration above bankfull stage of the Intermediate Regional and Standard Project Floods for Chittenango Creek.

TABLE 5

RATE OF RISE AND DURATION

CHITTENANGO CREEK AT STATE ROUTE 31 - BRIDGEPORT

Flood	Height of rise (ft.)	Time of rise (hr.)	Maximum rate of rise (ft. per hr.)	Duration above bankfull (hours)
Intermediate Regional	9.7	57	0.4	56
Standard Project	16.9	67	0.8	94

GLOSSARY OF TERMS

Discharge. The quantity of flow in a stream at any given time, usually measured in cubic feet per second (cfs).

Flood. An overflow of lands not normally covered by water and that are used or usable by man. Floods have two essential characteristics: The inundation of land is temporary; and the land is adjacent to and inundated by overflow from a river or stream or an ocean, lake, or other body of standing water.

Normally a "flood" is considered as any temporary rise in stream flow or stage, but not the ponding of surface water, that results in significant adverse effects in the vicinity. Adverse effects may include damages from overflow of land areas, temporary backwater effects in sewers and local drainage channels, creation of unsanitary conditions or other unfavorable situations by deposition of materials in stream channels during flood recessions, rise of ground water coincident with increased stream flow, and other problems.

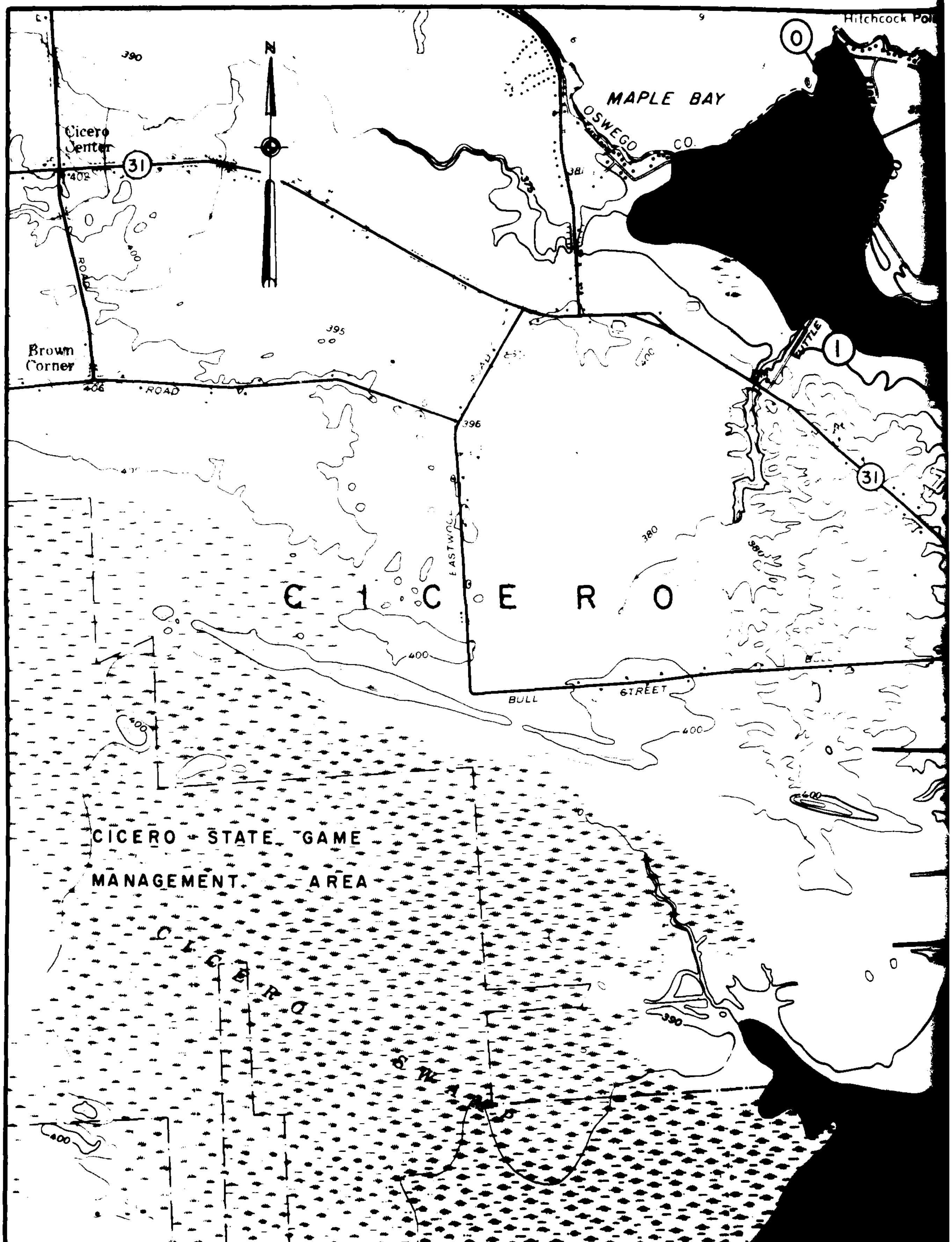
Flood Crest. The maximum stage or elevation reached by the waters of a flood at a given location.

Flood Peak. The maximum instantaneous discharge of a flood at a given location. It usually occurs at or near the time of the flood crest.

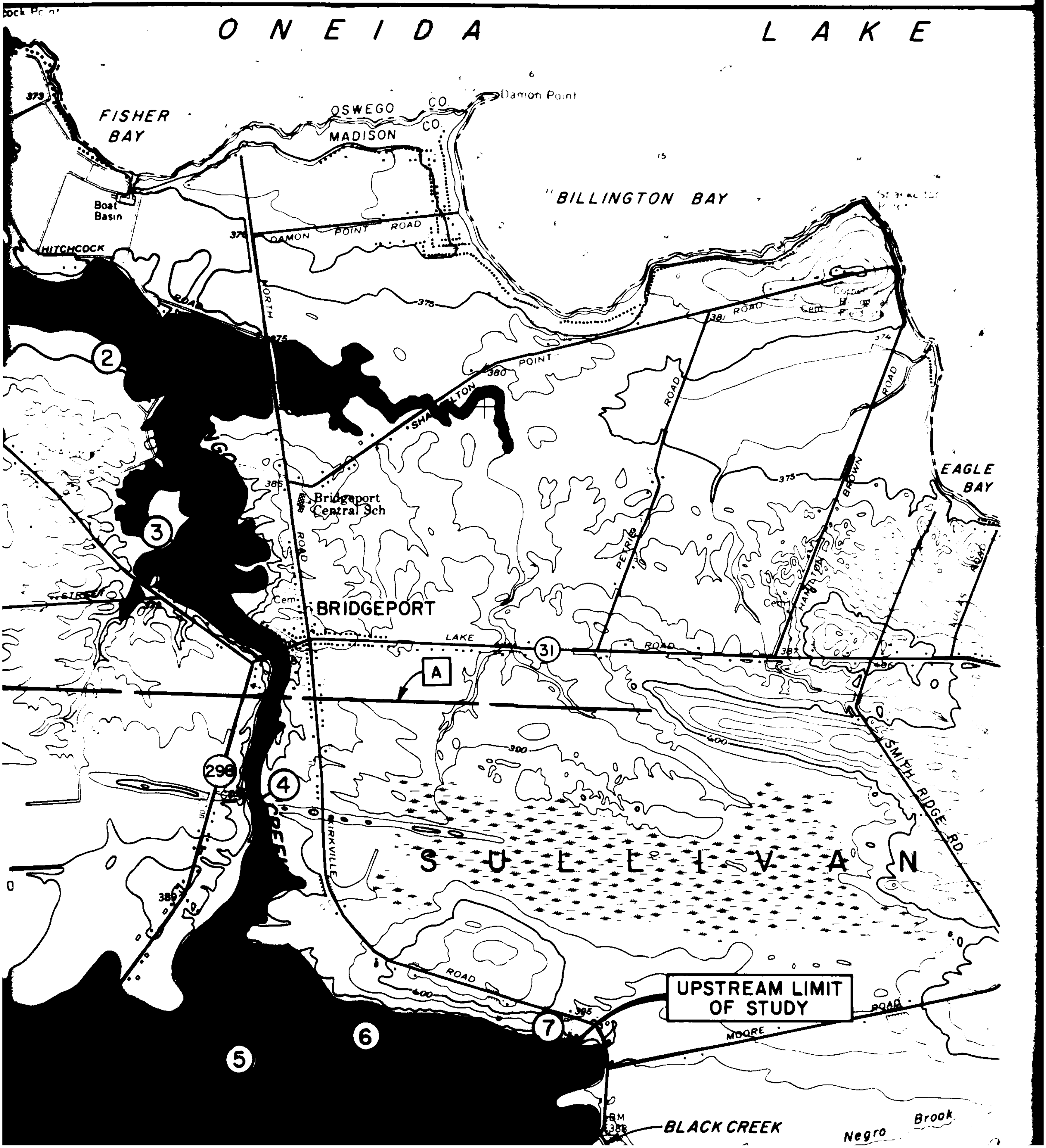
Flood Plain. The relatively flat area or low lands adjoining the channel of a river, stream or watercourse or ocean, lake or other body of standing water, which has been or may be covered by flood water.

Flood Profile. A graph showing the relationship of water surface elevation to location, the latter generally expressed as distance above mouth for a stream of water flowing in an open channel. It is generally drawn to show surface elevation for the crest of a specific flood, but may be prepared for conditions at a given time or stage.

Flood Stage. The stage or elevation at which overflow of the natural banks of a stream or body of water begins in the reach or area in which the elevation is measured.



N
Hitchcock Poi
MAPLE BAY
OSWEGO CO.
Cicero Center
31
402
390
395
Brown Corner
406
ROAD
396
EASTWOOD
380
1
31
C I C E R O
400
BULL STREET
400
390
CICERO STATE GAME
MANAGEMENT AREA
CICERO SWAMP


ONEIDA LAKE
FISHER BAY
OSWEGO CO
MADISON CO.
Damon Point
BILLINGTON BAY
Boat Basin
HITCHCOCK
DAMON POINT ROAD
NORTH ROAD
SHACKELTON POINT ROAD
ROAD
PETRIE ROAD
BROWN ROAD
EAGLE BAY
Bridgeport Central Sch
BRIDGEPORT
LAKE ROAD
31
A
298
CREEK
KIRKVILLE ROAD
SMITH RIDGE RD
SULLIVAN
UPSTREAM LIMIT OF STUDY
MOORE ROAD
BLACK CREEK
Negro Brook
2
3
4
5
6
7

LEGEND:

STANDARD PROJECT FLOOD

INTERMEDIATE REGIONAL FLOOD

MARCH 1964 FLOOD

(2) DISTANCE FROM MOUTH IN MILES

A LOCATION OF VALLEY CROSS SECTION

LIMITS OF OVERFLOW INDICATED MAY VARY SOME FROM ACTUAL LOCATIONS ON GROUND, AS EXPLAINED IN THIS REPORT.

SCALE OF FEET

2000' 0 2000' 4000'

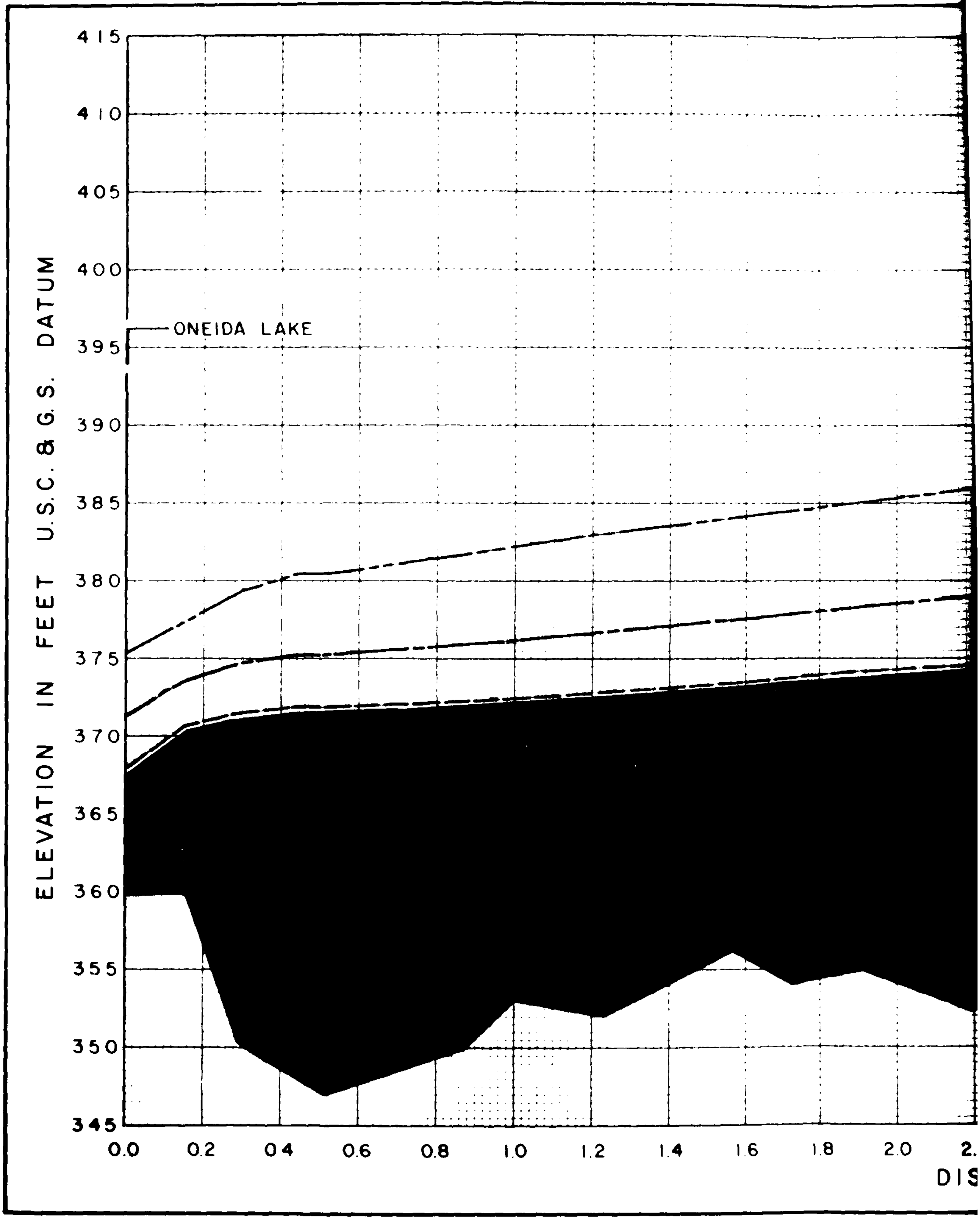
CHITTENANGO CREEK
BRIDGEPORT, NEW YORK
FLOOD PLAIN INFORMATION REPORT

FLOODED AREA
MILE 0 TO 7.04

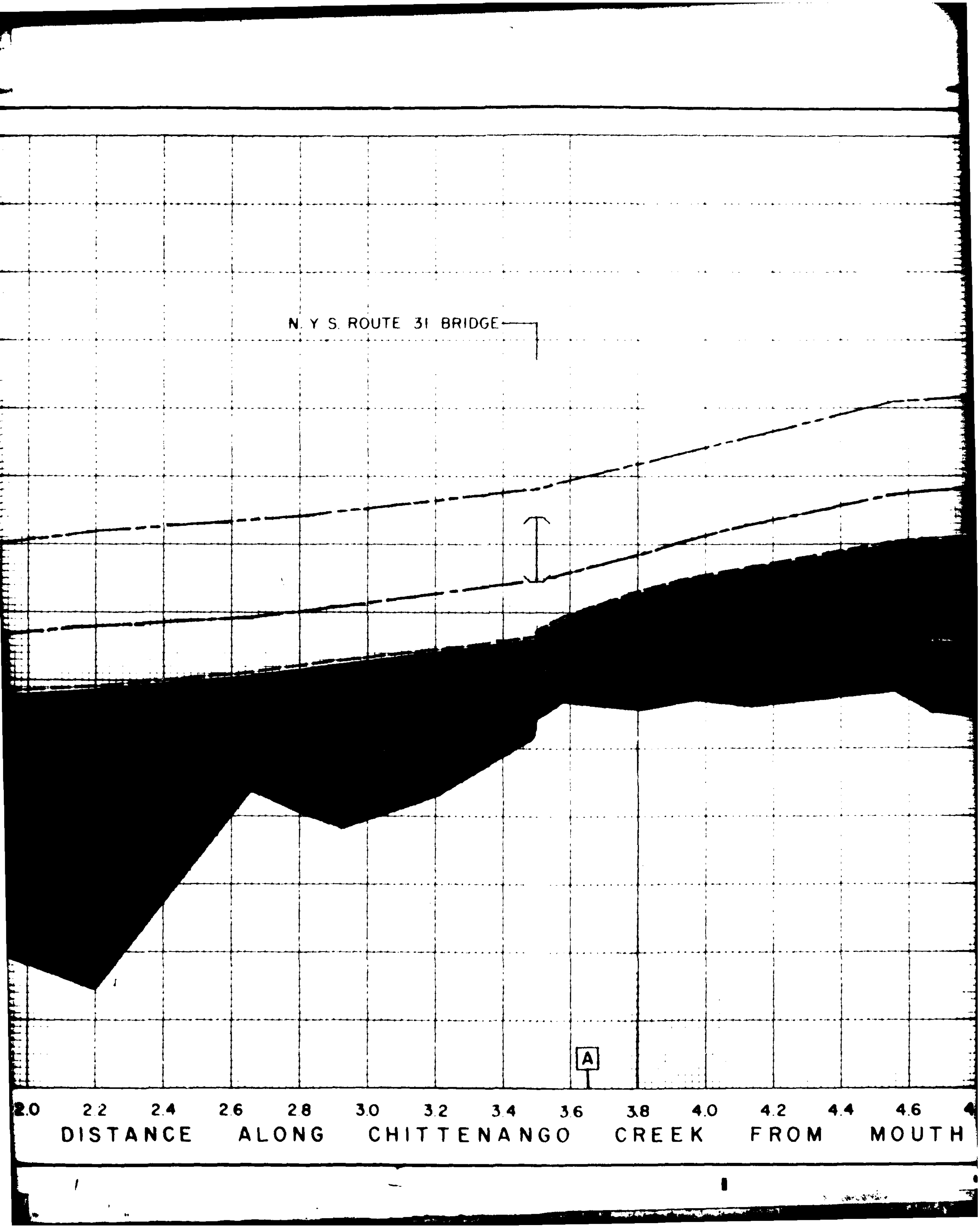
U.S. ARMY ENGINEER DISTRICT, BUFFALO
JUNE 1971

3

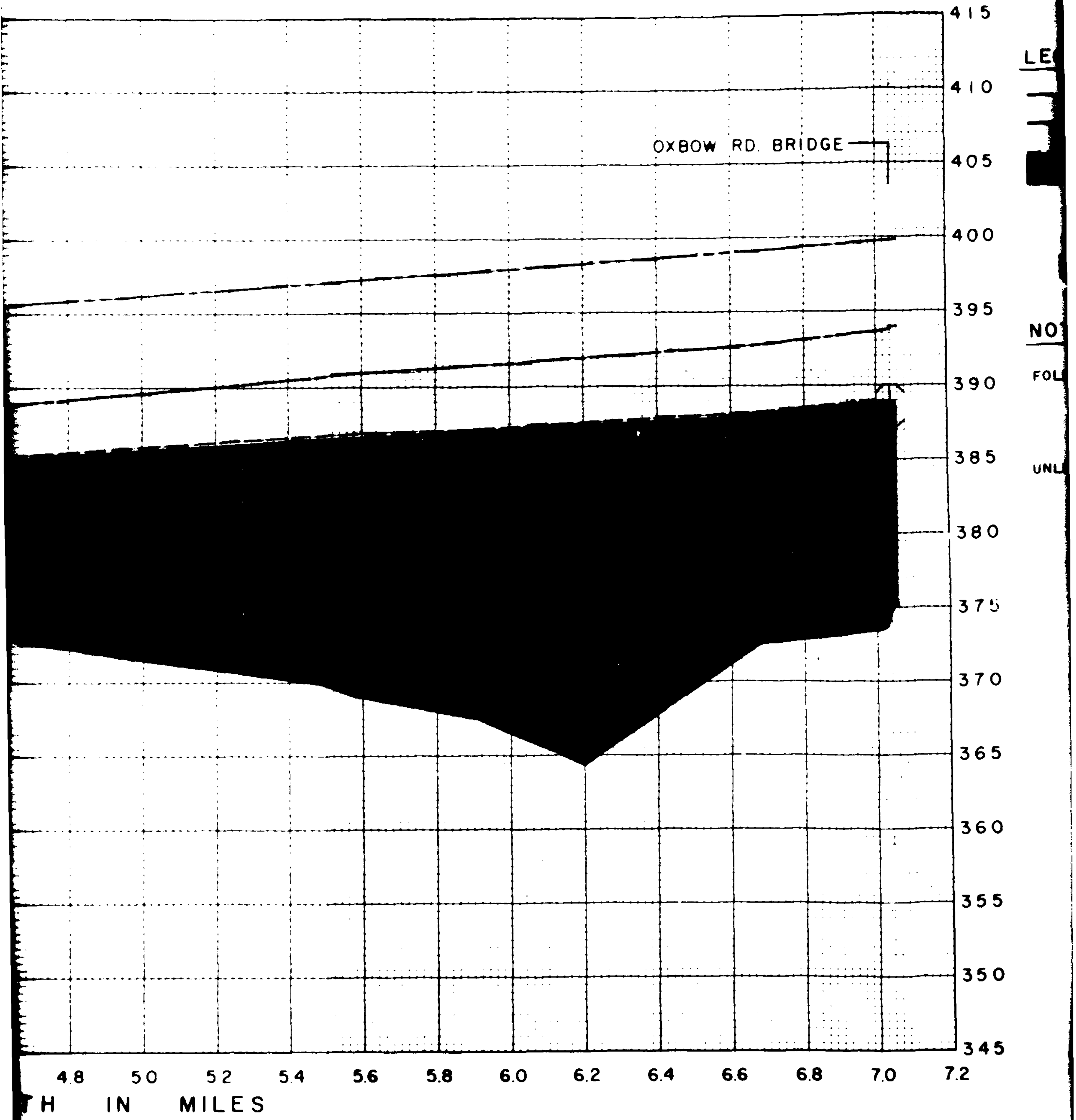
PLATE 3



ELEVATION IN FEET U.S.C. & G.S. DATUM
415
410
405
400
395
390
385
380
375
370
365
360
355
350
345
ONEIDA LAKE
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
2.
DIS



N. Y. S. ROUTE 31 BRIDGE
A
2.0
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8
4.0
4.2
4.4
4.6
DISTANCE ALONG CHITTENANGO CREEK FROM MOUTH



OXBOW RD. BRIDGE
415
410
405
400
395
390
385
380
375
370
365
360
355
350
345
4.8
5.0
5.2
5.4
5.6
5.8
6.0
6.2
6.4
6.6
6.8
7.0
7.2
TH IN MILES
LE
NO
FOL
UNL

LEGEND:

- STANDARD PROJECT FLOOD
- INTERMEDIATE REGIONAL FLOOD
- MARCH 1964 FLOOD
- APPROXIMATE STREAM BED
- APPROXIMATE FLOOR ELEVATION
- APPROXIMATE LOW STEEL ELEVATION
- [A] LOCATION OF VALLEY CROSS SECTION

NOTES:

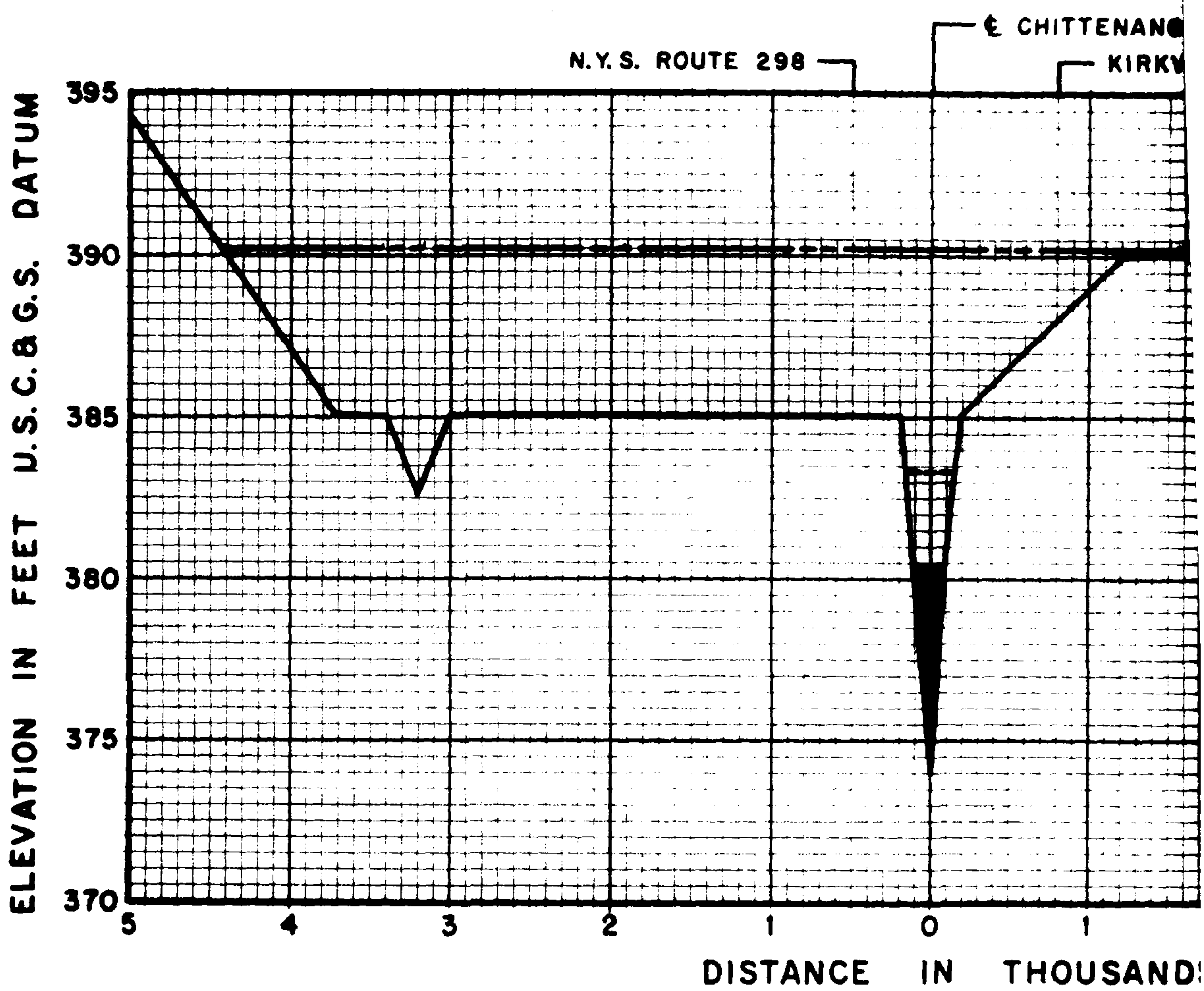
CREST PROFILE ARE BASED ON THE FOLLOWING:

1. EXISTING CHANNEL CONDITIONS
2. EXISTING STRUCTURES
3. EXISTING CONDITIONS OF DEVELOPMENT

LARGE SCALE FILLING WILL RAISE PROFILES UNLESS SUFFICIENT FLOODWAY IS PROVIDED.

CHITTENANGO CREEK
BRIDGEPORT, NEW YORK
FLOOD PLAIN INFORMATION REPORT
PROFILES
MILE 0 TO 7.04
U.S. ARMY ENGINEER DISTRICT, BUFFALO
JUNE 1971

PLATE 4



LEGEND:

STANDARD PROJECT FLOOD

INTERMEDIATE REGIONAL FLOOD

MARCH 1964 FLOOD

APPROXIMATE GROUND SURFACE

NOTES:

VALLEY CROS

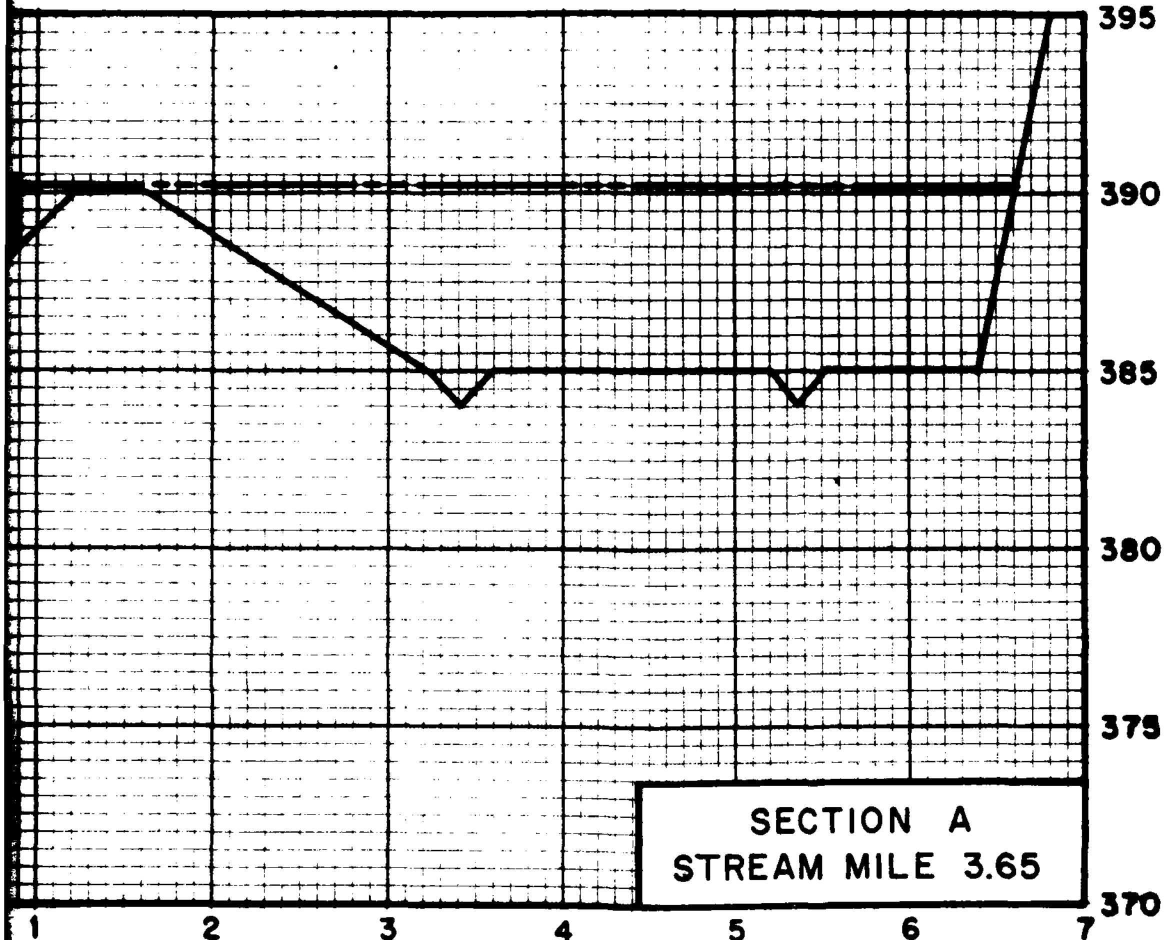
ON U. S. GEOLOGICAL

VALLEY CROS

DOWNSTREAM AND

/

TTENANGO CREEK
— KIRKVILLE RD.



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LLEY CROSS SECTION IS BASED
GEOLOGICAL QUADRANGLE MAP.

LLEY CROSS SECTION IS LOOKING
REAM AND IS LOCATED ON PLATE 3.

CHITTENANGO CREEK
BRIDGEPORT, NEW YORK
FLOOD PLAIN INFORMATION REPORT
VALLEY CROSS SECTION
A

U.S. ARMY ENGINEER DISTRICT, BUFFALO
JUNE 1971

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